

BAY SHORE SYSTEMS

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MISSION STATEMENT

“To improve the way holes are drilled in the foundation industry and making our customers the most successful contractors in the business.”

Bay Shore Systems Inc.

RK-12X

Limited Access Drill

OVERVIEW

The Bay Shore Systems RK-12X is a medium duty foundation drill that is mounted on an excavator. The attachment utilizes the excavators hydraulic system for its operation. The RK-12X is ideally suited for digging foundation holes in confined areas,

where overhead clearance is limited or where site conditions require a drill rig with reach or the characteristics of an excavator carrier. The RK-12X retains the advantages of a track mounted excavator and adds the capability of a highly productive drill rig.

CAUTIONS and WARNINGS

All products manufactured by Bay Shore Systems, Inc. are sold with the expressed understanding that the purchaser is thoroughly familiar with the safe and proper use and application of our products.

The responsibility of proper care and use of our products rests with the user.

Failure of the product can occur due to misapplication, abuse, neglect, or improper maintenance. Product failure could cause further damage to the machine, other equipment or property, personal injury or death.

There are numerous safety regulations and standards that govern proper use of mobile construction equipment. We can not address them all here in this manual for all geographical locations or specific applications. However, we do require that all applicable safety regulations are followed and adhered to when ever using Bay Shore Systems Inc. machinery.

Our products have limitations and maximum torque, load, and operating capacities. Do not exceed the recommended operational pressures, flows or loads as set by our staff and listed here in this document.

As specific components experience wear over a period of time, they may need to be replaced. A parts breakdown and listing is included in this manual for reordering components. Do not replace items with substitute brands or products without the consent of Bay Shore Systems customer service department.

Bay Shore Systems Inc.

RK-12X Limited Access Drill

SPECIFICATIONS

EXCAVATOR

Komatsu PC-95

Weight	20,080 lbs
Horsepower	72 HP
Max. system pressure	4980 psi
Hydraulic pump flow	2 x 19.5 gpm

ATTACHMENT

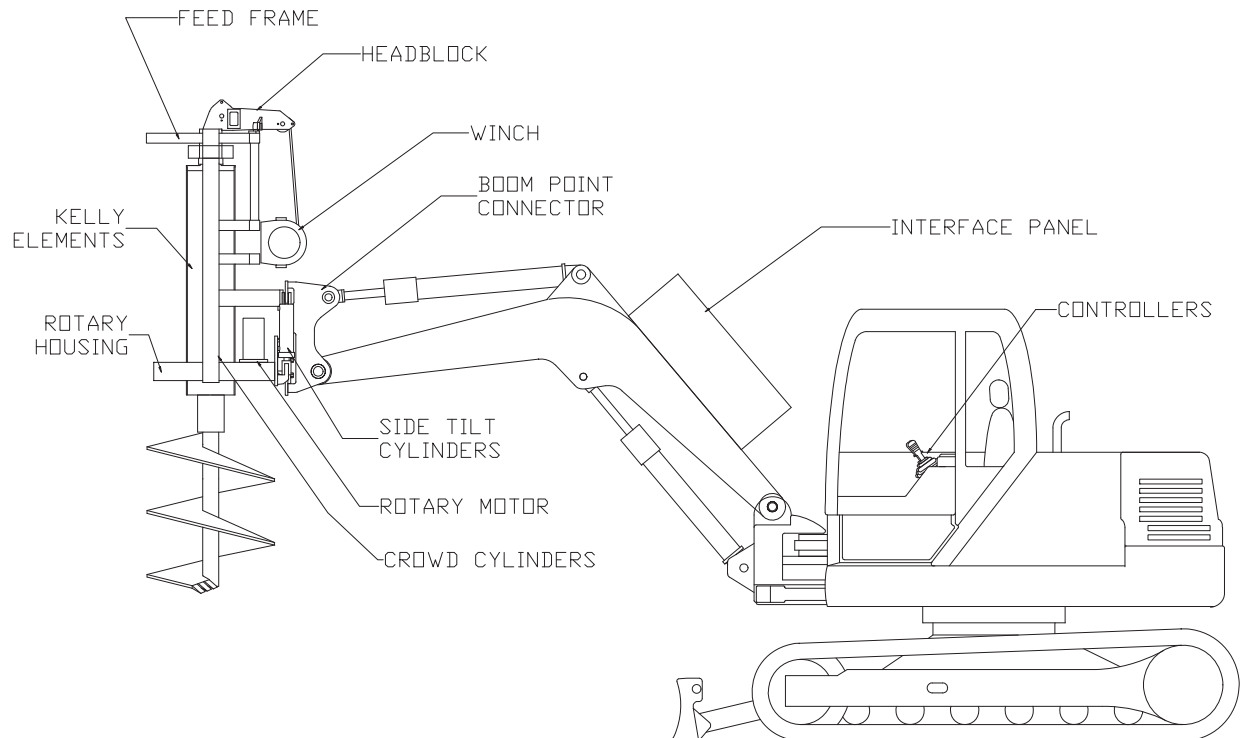
RK-12X

Weight	3,300 lbs.
Height w/o tooling	6'
Crowd stroke	21"
Kelly Winch	Pullmaster PL-5
line speed	150 fpm
Service winch	Pullmaster PL-2
Rotary	
torque	8,000 FT/lbs
speed	
low drill	0-30 rpm
high drill	0-60 rpm
spin off	120 rpm
30' Kelly Bars	8 element
45' Kelly Bars	10 elements
Digging depth	45 feet
Diameter	up to 3'

GENERAL

The RK-12X consists of a rotary, a kelly winch assembly, a boom point connector, a service winch and the hydraulic interface panel.

Each of these assemblies will be described in the following sections of this manual.



ROTARY

The rotary is a gear reduction box that is mounted to the lower end of a feed frame. The drive motors are high torque, hydraulic motors that are directly coupled to the output quill assembly by a gear drive. The output gear is supported by a pedestal bearing arrangement that has a square through opening. The square opening causes engagement on the outside of the 12" square element.

The rotary housing is sealed and partially filled with a lithium based grease (see maintenance data for description) that lubricates the gears and bearing.

The hydraulic motors are high torque, disc valve motors. The motor speed is controlled by a toggle switch in the cab. Toggling the switch from low to high delivers either one pump or two pump delivery to the motor.

Spin-off mode is accomplished by depressing a push button which shifts a series parallel valve up near the motors. All the oil flow from both pumps is now delivered to one of the motors, which produces a higher rotation speed.

KELLY WINCH

The kelly winch is a Pullmaster PL-5 equal speed winch. The kelly cable is routed over a headblock assembly that guides the cable over the top of the feed frame and through the center of the kelly bars. The kelly line is connected to the inner kelly bar with a swivel.

The head block is mounted on a bearing and a set of cam follower bearings that allows the unit to swivel and minimize the fleet angle to the winch.

The winch is fitted with a shutoff device that stops the winch automatically when the kelly line is slacked.

This system allows the operator to lower the kelly at high speed and eliminates the problem of bird nesting the line on the winch. This is accomplished by a spring loaded roller assembly and a limit switch. When the line is slacked, the roller assembly engages a limit switch that energizes a solenoid valve. When this solenoid valve is energized, the main winch valve will not operate. This system can be overridden by the operator.

Depressing the yellow thumb switch on the left joystick is the kelly winch shut-off override button.



BOOM POINT ASSEMBLY

The boom point assembly is the structure that connects the excavator to the attachment. The rear portion of the connector pins to the end of the excavator boom and the stick cylinder. The stick cylinder controls the fore and aft tilt of the attachment. The forward portion is attached to the rear housing by a pivot and two cylinders. This connection allows the drill unit to be tilted from side to side.

The front half of the boom point connector is the feed frame that is fitted with a set of inner tracks. The kelly bars are contained in the frame. At the top of the bars is a crowd plate that is fitted with a kelly adapter.

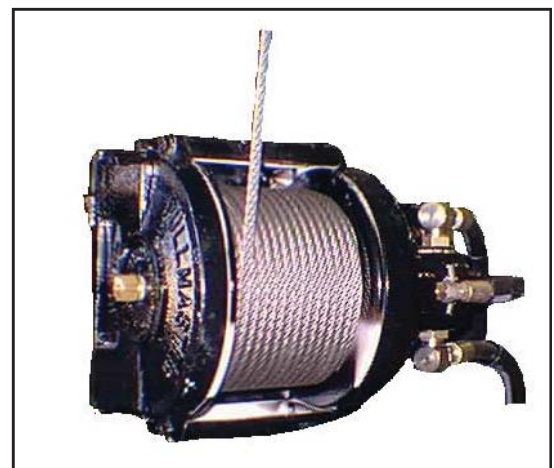
The crowd plate travel is controlled by the crowd cylinders. Each side of the crowd frame has guides which travel on the tracks and allows it to slide up and down.

SERVICE WINCH

The service winch is a Pullmaster PL-2. The service winch is not fitted with a shutoff assembly.

This is a 2000 lb. Load capacity winch which is designed for tool and material handling at the drill site. It is important that load capacities are not exceeded.

The winch is mounted to the rear of the cage assembly. The wire rope is routed through a set of sheaves on top of the cage then down to an anchor at the rotary. Routine inspection of the winch, wire rope, sheaves, hook and safety latch is recommended at periodic intervals.



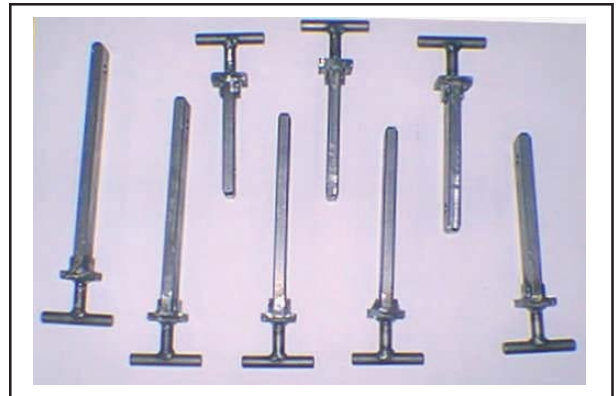
45 ft. KELLY BAR

The 45' kelly bar set consists of ten square telescoping elements. The overall length of the bar set is 65 1/2 inches. At the upper end of the outer kelly bar is a flange that forms the connection point for the crowd frame.

The outer kelly bar is allowed to slide through the rotary drive flange that is assembled in the rotary housing.

The kelly bars telescope to allow the drill attachment to drill to depths of 45'+. The bars are fitted with internal and external stops to prevent them from becoming disengaged. The inner kelly bar has a swivel on the top end that connects to the kelly cable. The bottom of the inner kelly terminates with a kelly stub that connects to various drilling tools.

The kelly bar set is equipped with a locking element feature. A catch pawl has been installed at the bottom of the outer most element. By rotating the pawl and inserting a locking pin the kelly elements can be held rigid. This prevents the elements from collapsing when drilling on hard ground formations.



LEVEL INDICATOR

The level indicator system consists of a sensor panel mounted on the drill attachment and an indicator panel mounted in the excavator cab. There are two meters in the indicator panel. The upper meter indicates the fore and aft attitude of the attachment; the lower meter indicates left and right attitude.



HYDRAULIC INTERFACE PANEL

The hydraulic interface panel consists of valves that integrate the hydraulic components of the drill attachment into the hydraulic system of the excavator. The interface consists of several circuits, each of which will be described.

The excavators pump outlet flows are directed through the attachments interface. The power beyond flow out of the interface panel is then directed back to the excavators main control valve.

The basic drill circuit utilizes a single section power beyond control valve. The power beyond port is routed back to the excavators control valve bank. When this valve is engaged, oil from the first pump is directed to the rotary drive.

The second excavator pump flow is routed through a flow divider. The flow divider splits the flow of the second excavator pump, one output is connected to the first inlet section of a power beyond valve. The other output is routed to a mid-inlet port on the valve. The first section of the power beyond valve controls the crowd. The second valve controls the service winch. The mid-inlet port recombines the split flows and supplies additional power to the third and fourth sections which powers the kelly winch and provides additional flow to the drill circuit.

The drill rotation is controlled by the right hand joystick controller, it directly controls the drill valve connected to the main pump. A toggle switch changes the drill speed from low to high. In the high position it energizes a set of solenoid valves, which opens the pilot control to the second rotary valve. Additional flow from the second pump is now available to produce a high rotation drill speed.

The rotary motors are disc valve motors. They are supplied by oil from the control vales through a series parallel valve. A solenoid controls the spool in the series/parallel valve. Energizing the valve is controlled by the yellow button on the right hand joystick. This valve creates the spinoff mode by directing the oil flow from both pumps to one of the rotary motors. The drill control handle must be moved to the drill forward or reverse position while the push-button is depressed to operate at spin-off speed.

A winch select toggle allows the operator to control either the service winch or the kelly winch. The left hand joystick controls the selected winch.

The rotary and crowd functions are controlled by the right joystick controller. The winch and swing is controlled by the left hand joystick.

OPERATION

While the RK-12X attachment is easy to operate, it is a heavy piece of construction equipment and should only be operated by personnel that are experienced with operating construction equipment and trained on the operation of the LoDril.

Certain excavator controls have been converted to operate drill functions. Each function and its control will be described in the following section of this manual. Reading and understanding of these modifications is mandatory to ensure safety, as well as, proper use of the attachment.

The excavator joysticks now have multiple functions that are controlled by a mode selector switch and buttons in the handles.

The mode switch has two positions, i.e. drill and Excavator. When the switch is in the excavator position, the excavator joysticks control their original functions. In this mode, the drill rotary, crowd and winch as well



WARNING

MODES OF OPERATION

It is critical that the operator be familiar with these control modes before operating the machine.

as the buttons in the joystick handles are inactive. The boom, swing and track functions have not been changed.

The stick and bucket functions now control the attitude of the drilling attachment and will be described in the next section of this manual.

We recommend that the mode switch be placed in the EXCAVATOR mode when an inexperienced operator (truck driver) may have to operate the machine

EXCAVATOR MODE

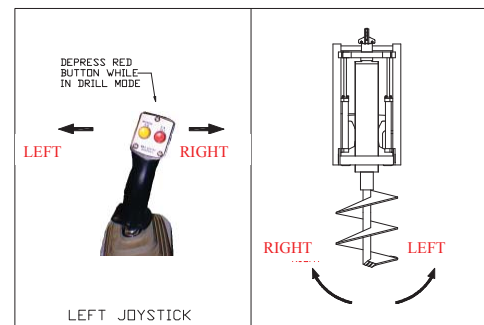
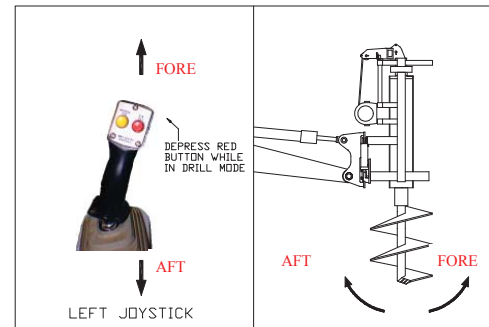
The track, swing and boom controls have not been reasigned and control their original functions. Refer to the excavator operator's manual for their use. When the mode switch is in the "excavator" mode, the stick and bucket controls perform the functions described.

STICK CONTROL (FOR/AFT)

The stick control now operates the **fore and aft tilt** on the drill. Pushing the left joystick lever forward moves the auger away from the operator. Pulling the lever back moves the auger towards the operator.

BUCKET CONTROL (SIDE TILT)

The bucket control now operates the **side tilt** cylinders. Moving the right joystick lever to the left moves the auger to the left.



DRILL MODE

When the mode switch is in the DRILL mode, the joystick controls operate different functions. The red buttons on the handles are active and change their respective joystick functions.

LEFT JOYSTICK

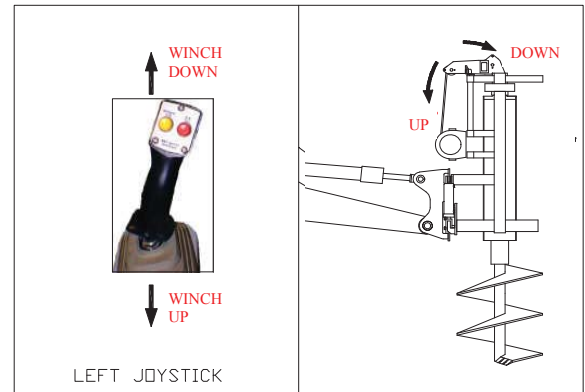
WINCH CONTROL

The kelly and service winch's are controlled by the left hand joystick controller. The toggle switch on the control box identifies the winch to be powered. Pushing the lever forward lowers the winch. Pulling the left joystick lever back causes the winch to raise the kelly bars or object..

FORE/AFT

If the joystick is moved forward or back while the red button is depressed, the fore/aft function is activated. Pushing the handle forward moves the drilling tool away from the operator.

KELLY WINCH

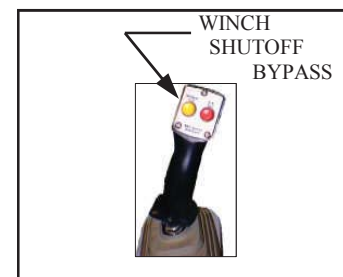


WINCH SHUTOFF BYPASS

The kelly winch is equipped with a shutoff mechanism that automatically stops the winch while lowering when the line becomes slack. This shutoff system can be disabled by depressing and holding the yellow thumb button on the left hand joystick while activating the winch.

SWING

Moving the left joystick left and right always controls the swing function regardless of the position of the mode switch or pushbutton on the handle.



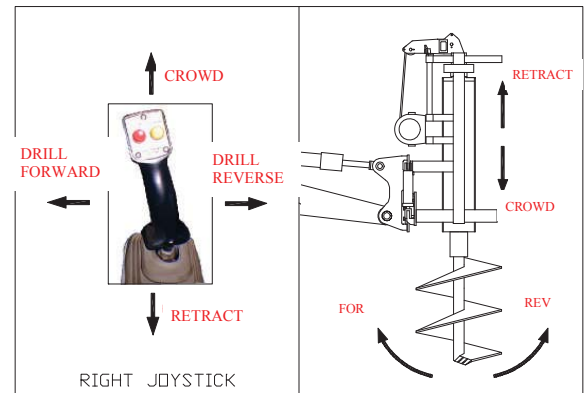
RIGHT JOYSTICK

DRILL/CROWD CONTROL

The drill/crowd control is the right hand joystick. Pushing the joystick forward causes the drill attachment to crowd (slide) down through the boom-point connector. Pulling the joystick back raises the attachment.

Pushing the joystick to the right causes the drill to rotate in the clockwise direction; to the left causes counter clockwise rotation.

The joystick allows the drill to be rotated and crowded at the same time by moving the joystick to the left or right and forward or back at the same time.



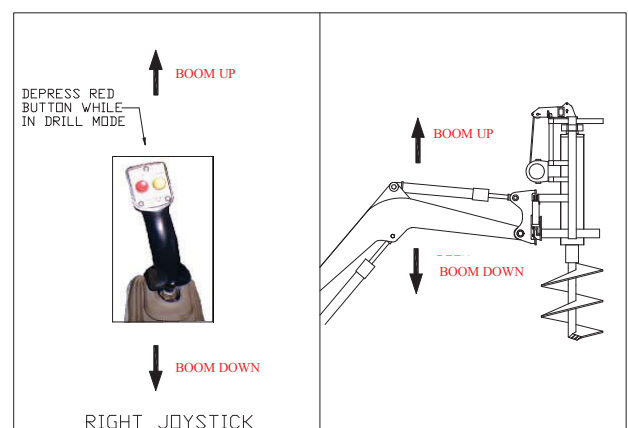
DRILL SPIN-OFF CONTROL

The yellow thumb button on the top of the right hand joystick controls the drill spin-off mode. In its normal (at rest) condition the drill will operate in the selected drill speed. Depressing and holding the yellow thumb button causes the drill to operate in the spin-off mode. The button must be held in position while the drill control is operated to obtain spin-off.



BOOM CONTROL

If the joystick is moved forward or back while the red button is depressed, the boom function is activated. Pushing the handle forward lowers the excavator boom.



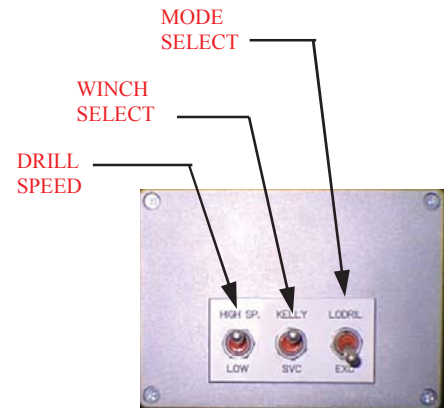
CONTROL BOX

DRILL SPEED SWITCH

The drill speed select switch allows either one or two of the excavators pumps to power the drill circuit. This function does not effect the torque characteristics of the rotary.

MODE SELECTOR SWITCH

When the switch is in the excavator mode the joystick controls their original functions. When the switch is in the drill mode the joysticks control the drill functions. The Excavator functions are available while in the drill mode by depressing the red buttons on the respective controllers.



LEVEL INDICATOR PANEL

The needles on the indicator meters show the operator the attitude of the attachment. If the Left/Right meter needle is to the left of center, the tool must be moved to the right to plumb the attachment. Similarly, if the Fore/Aft needle is on the "Fore" side of center, the attachment must be tilted so the tool moves toward the operator to plumb the attachment.





SEQUENCE of OPERATION

Prior to drilling, perform all pre-operation checks that are outlined in the maintenance section of this manual. Prior to starting the engine, make sure that personnel are clear of the machine. Refer to the excavator's operating manual for the engine startup procedure.

Before moving the machine, make sure that all personnel are clear and that there are no obstacles in the path of the intended movement. If the operator's view is obstructed, movements should only be performed with the aid of ground personnel that can direct the movement.

Install a drilling tool on the machine if one is not already installed. Use extreme caution when installing the tool. Ground personnel have to work in close proximity with the kelly and can be injured if one of the rig's functions are moved abruptly or unexpectedly.

By using the rig's controls, i.e. travel, swing, boom and tilts, position the auger near the first hole. Prior to positioning the tool precisely, plumb the tool using the fore and aft and side tilts. Position the auger over the hole location.

If the rig will be swung to one side of the hole to spin cuttings off the auger, verify that there are no obstacles for the attachment path or the tail swing of the rig.

To start drill, raise the engine rpm to an appropriate rate (experience will dictate). Lower the tool onto the ground by lowering the kelly winch. The winch will stop automatically when the tool contacts the ground.

When lowering the kelly winch, the control must be engaged gradually to prevent the shutoff mechanism from chattering. If feathering the control is ineffective, bypass the shutoff until the winch is operating smoothly. Reactivate the shutoff before the auger contacts the bottom of the hole.

To rotate the drill, move the right hand joystick controller to the right. Switch to "High" drill speed if higher rotation speed is desired. The auger can be crowded into the ground by pushing the right-hand joystick forward. This can be done at the same time as the control is held to the right. A continuous feed of the kelly winch is necessary while crowding. The winch shutoff mechanism will prevent excessive line from being spooled off. Push the left joystick forward and hold in this position while crowding.

Once the auger is full, raise the tool with the kelly winch and crowd. It is best to engage the winch first to break the tool loose and then engage the crowd and winch simultaneously. When the auger has been raised above the ground level, swing the rig to the appropriate location and spin the cuttings off the auger. Always be alert for personnel and obstacles when swinging the rig. If there is any doubt about the safety of such movements, make them only with the direction of ground personnel that can direct the movement safely. To spin the cuttings off the auger, engage the auger in forward or reverse (experience will dictate which is preferred) and depress and hold the joystick button switch. The auger will spin at high speed and throw the cuttings off the auger.

Swing the auger back over the hole and repeat the drilling sequence.

When drilling is completed or the rig will not be used for some time, it is best to lay the attachment horizontally on the ground. Cylinders that set for extended periods can leak down and put significant strains on the kelly stub. To lay the attachment down, boom the rig up to a height that will allow the stub or tool to clear the surface. Using the fore and aft tilt, rotate the attachment under the boom. Boom the rig down until the attachment rests on the ground or dunnage.

Switch the "Mode function" toggle back to excavator if it will not be powered back up by the same operator, or if it will be loaded for transport.

MAINTENANCE

Preventive maintenance includes normal inspection and servicing that will keep the drill rig in peak operating condition and prevent unnecessary shut-downs. This servicing consists of periodic inspection of the entire unit, repairing or replacing worn or damaged components, and making adjustments when required.

For best performance, keep the entire unit clean, change filters and lubricate components at the recommended intervals and stop any leaks that occur.

It is important that no dirt is allowed to enter the hydraulic system. Under normal conditions, keeping the hydraulic system clean should be no problem. The main source of contamination is when oil is added to the system or when hoses or components are replaced. When adding oil, make sure it is clean and compatible with the oil in the system. Inspect hoses constantly and replace damaged hoses immediately. Hoses that have been kinked, abraded into the reinforcing wire or are leaking are hazardous and should be replaced immediately.

PRE START

Before operating the drill, perform all recommended pre start procedures for the excavator as outlined in the owner's manual.

The following check list is a guide for the excavator and the drilling attachment.

- ◆ Check engine oil, fuel and coolant levels
- ◆ Check hydraulic oil level
- ◆ Visually inspect entire rig for leaks, loose bolts, or damaged hoses or components
- ◆ Lubricate daily grease points per excavator's owners manual
- ◆ Grease kelly line sheaves

- ◆ Inspect kelly cable condition
- ◆ Inspect nyotron wear pads on crowd frame
- ◆ Grease boom point connector swivel

WEEKLY

- ◆ Perform required excavator maintenance
- ◆ Grease headblock bearing and rollers
- ◆ Check kelly line condition
- ◆ Inspect kelly line swivel
- ◆ Grease kelly crowd bearing

6 MONTHS

- ◆ Check lube grease level in the rotary.
- ◆ Change oil in winch
- ◆ Change hydraulic oil filters every 500 operating hours

MAINTENANCE DATA

Rotary ----- Chevron Dura-Lith Grease
EP NLGI 00

Winch ----- 90 wt gear oil

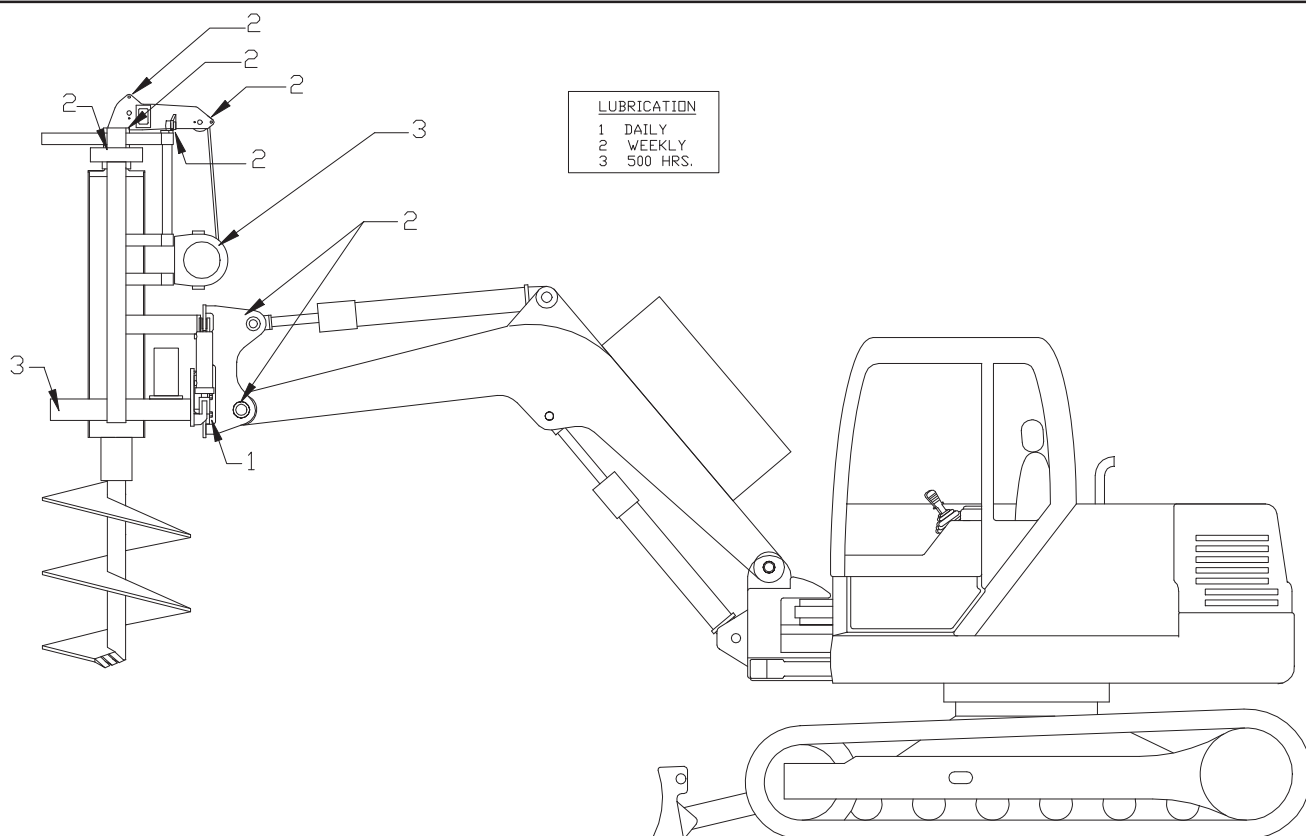
Grease Points ----- EP Grade 2 Grease

- ◆ Head block sheaves
- ◆ Head block bearing
- ◆ Crowd Frame bearing
- ◆ Head block rollers
- ◆ Boom point connector swivel

Hydraulic oil ----- Chevron Tractor Fluid

Kelly line cable ----- 3/8" Non-rotating w/ lt. thimble
60' long (19 x 7)

Service winch cable 1/4" (6 x 37) 50' length



SAFETY

As with any piece of mobile construction equipment, safety is of the utmost importance when working with this rig. Safety procedures that are used around cranes, drill rigs, excavators, etc., should be followed around the Bay Shore drill.

This drill rig should be operated only by an operator that is familiar with drill rigs and who has been trained to operate this specific rig.

Prior to operating any function on the rig, the operator should verify that it will not create a hazard. It will frequently be necessary for a crew member to assist the operator when travelling, swinging or articulating the attachment. If the operator cannot see critical areas when making a movement with the machine, he should do so only from signals from a crew member who can direct the movement safely.

No work should be done on the rig with the engine

running. Work that must be performed routinely such as changing a tool must be done with close coordination with the operator.

The drill rotary is a very powerful device. Crew members should stay clear of the flight while the unit is in operation. They should be especially careful to avoid pinch points or situations where they could become entangled in the flight.

High pressure hydraulic hoses can be very dangerous. Avoid working in close proximity with pressurized hydraulic hoses. Damaged hoses can burst unexpectedly, hot oil can injure personnel. Pinhole leaks can inject oil into personnel that can cause serious injury or death. Replace worn or damaged hoses immediately. Make sure hoses are depressurized before performing any work on them.

SERVICE WINCH SAFETY

“This drilling machine is not a crane. It has a limited picking zone and capacity, and can tip over. Operate with care.”

Several factors are considered when adding a service winch on your specific base machine. These factors are . . .

1. Horsepower availability
2. Ground contact area of the tracks
3. Load capacities based on the “center of gravity.”

The service winch has been added only for the purpose of handling drilling tools, rebar cages and casings at a drilling site. Large, heavy objects will have an effect on the stability of your machine. The operator and crew must be aware of the picking capacities of the winch. When performing a “pick”, the weight of the object is transferred to the ground contact areas of the base machine when it is raised off either the ground or an elevated surface.

Thorough considerations must be made by the operator before picking up any object.

- 1) **Is the ground surface stable?** Soft or unstable ground, working surfaces or plat forms may become depressed and may cause a tipping effect to the machine. This will offset the center of gravity unexpectedly. Use extreme caution, therefore, when the machine is on unstable ground, surfaces or platforms.
- 2) **Is the ground surface level?** A slope of one or two degrees can have a major effect on pick capabilities. Especially if the object is picked up on the uphill side of the machine, held suspended and then swung to the down hill side. The weight shift of the load is transferred to different areas while in movement.

- 3) **Is the object within my pick zone?**
Ensure that the mast is in a vertical position. The optimum pick area is within a five foot radius of the final service line sheave. When performing an angled pick be aware of the swing factor of the object. Minimize angle picks as much as possible. Maneuvering the machine over an object prior to picking is the preferred technique.
- 4) **Pick the load up slowly.** A rapid pick can cause a sudden instability in the base machine. All picks should be performed in a manner so that the operator has complete control of the objects movement. A swinging object is out of control. The inertia generated also changes the center of gravity of the machine.
- 5) **Winch, cable and rigging equipment.**
All components utilized in the hoisting of object must be in good condition. Constant and through inspection of these items is essential for the safety of all personnel. Inspection of hoisting hook is recommended by the manufacturer and required by OSHA. Check and document the hook throat opening when new and at monthly intervals thereafter. Safety latches must be installed and operable. Cable slings, chokers and bridles must also be inspected for damage and deformities. Frayed cables must not be used under any circumstances and they should be immediately replaced.



WARNING

This drilling machine is not a crane.

When picking loads operate with extreme caution.

GUIDELINES FOR THE INSTALLATION AND MAINTENANCE OF WIRE ROPE

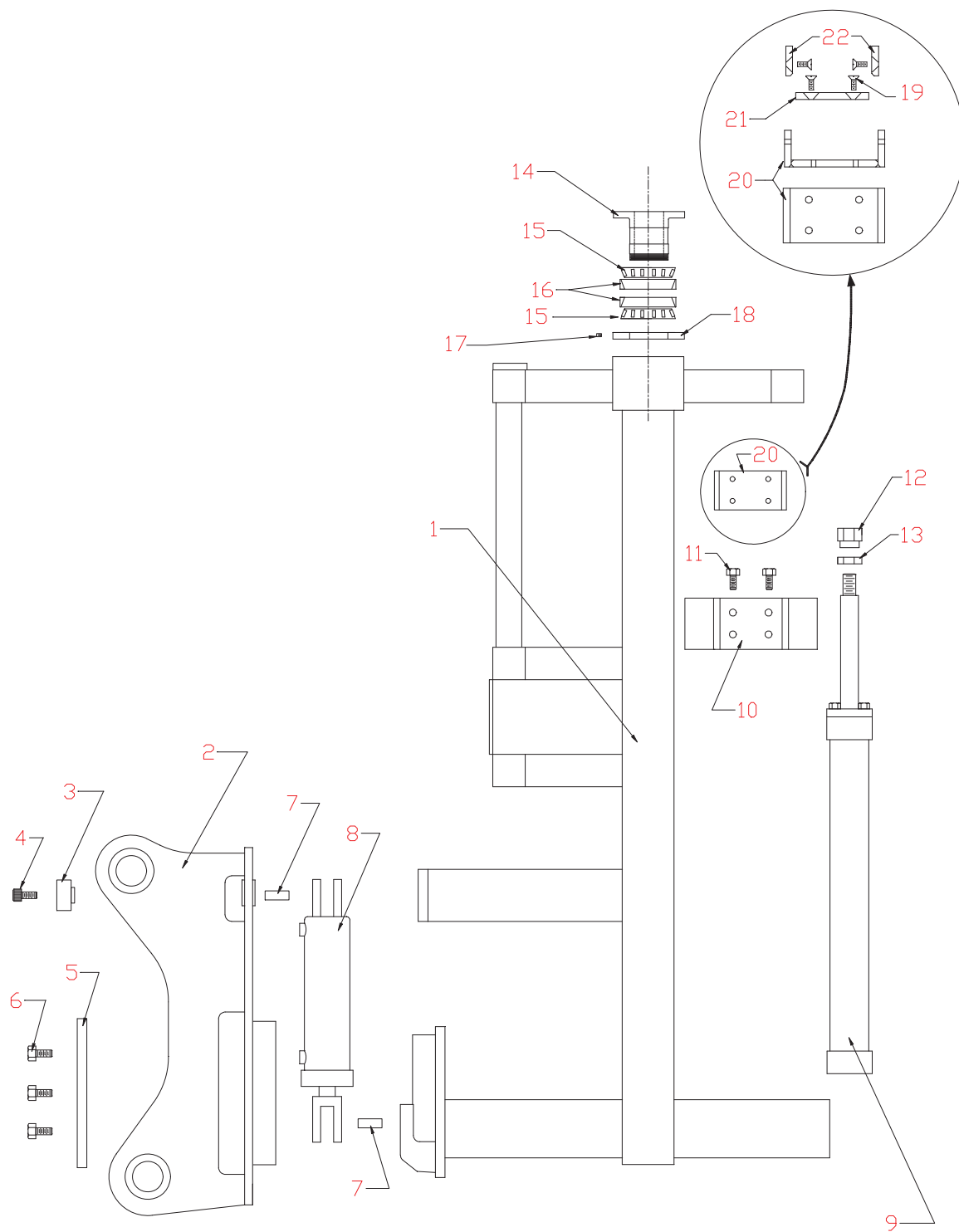
- 1) **Unload and properly relieve any twists from the rope.** Pull the rope off the shipping reel or unroll it from a shipping coil. Lay the rope on the ground in direct line with the winch drum and sheave assembly. This helps release any twists that are in the rope. If not done properly, a kink may develop which will permanently damage the rope.
- 2) **Attach the rope's end to the drum.** Route the rope end through the necessary sheave assembly. Pull the rope up to the drum spool. Slowly rotate the drum on the winch spool until the smaller opening is on top and facing the sheave. Remove the termination wedge from the slot. Before making any end attachment, be sure the rope strands are free to adjust. (In other words, make sure the end of the rope is not welded together.) Insert the rope end into the smaller hole. Pull enough cable through to double it over and reinsert back into the slotted hole. Adjust the lines to where they are parallel. Pull the live end of the cable up enough to decrease the eye hole created by the two cables. Insert the termination wedge into the eye and sharply pull the live end tight. Be sure that the dead end of the cable is flush with the outer circumference of the drum spool.
- 3) **Wind the rope onto the drum slowly and carefully.** A slight load is recommended to ensure a uniform lay of the cable on the spool. Two pieces of wood clamped side by side with the cable running between them will create adequate tension on the cable. It is essential on smooth faced drums that the first layer is spooled with wraps tight and close together since the first layer forms the foundation for succeeding layers. If needed, use a rubber, lead or brass mallet (but never a steel hammer) to tap the rope into place.

It is important to apply a tensioning load to the rope during the break in process. If not then the inner layers will become loose enough that the upper layers become wedged into the lower layers under a load, referred to as "pulling in", which can seriously damage a rope.

A newly installed rope will need to go through a break in period before it is trained to lay properly. Slowly raise and lower a new rope with a light load at first before operating at a fast rate under a heavy load condition. Watch the rope travel and the drum winding for any potential problems.

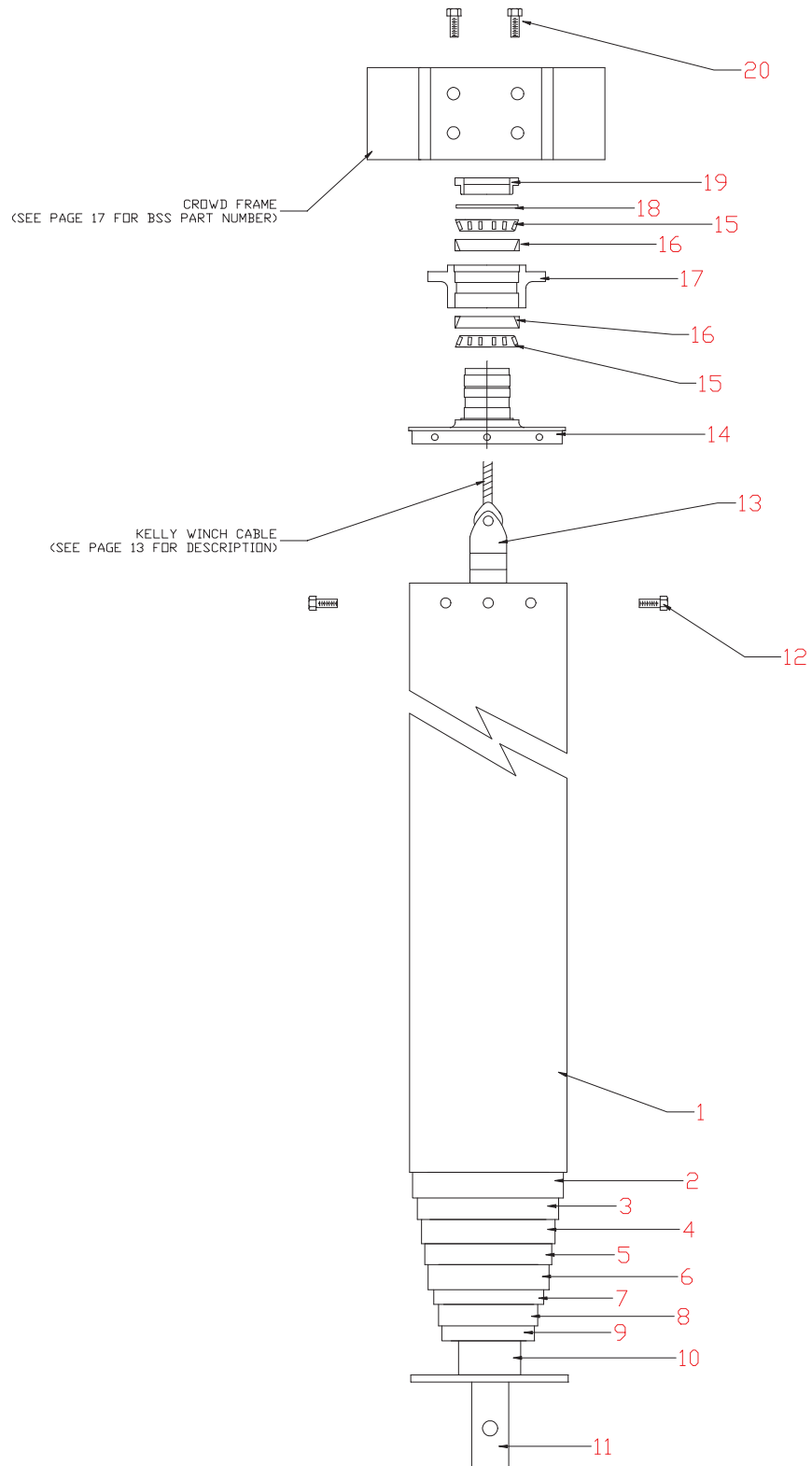
- 4) **Always leave three wraps on the drum.** Although ANSI and OSHA states that two wraps must remain on the drum in the extreme low position we recommend at least three wraps always remain on the drum.

PARTS DRAWINGS



BOOM POINT CONNECTOR

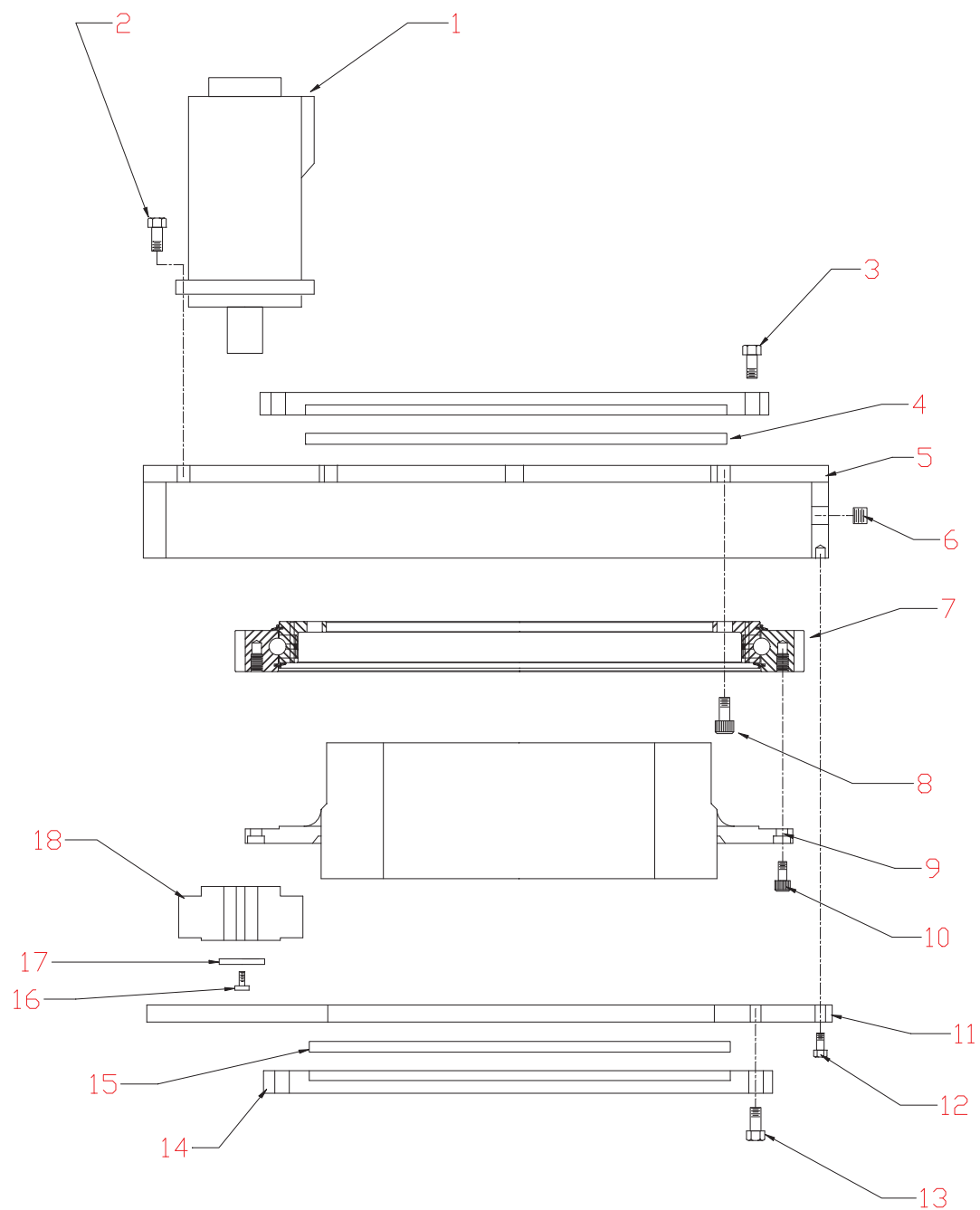
<u>ITEM</u>	<u>DESCRIPTION</u>	<u>QTY.</u>	<u>MFG.</u>	<u>PART #</u>
1	MAIN FRAME	1	BSS	B01-00-5000
2	BOOM CONNECTOR	1	BSS	B01-00-5007
3	RETAINER	1	BSS	B01-00-5010
4	BOLT	2		3/4-10 x 3"
5	RETAINER	1	BSS	B01-00-5009
6	BOLT	6		5/8-11 x 1.5 L/WIRE
7	PIN	4	SWECO	1"
8	CYLINDER	2	SWECO	2.5 x 6 x 1.125
9	CYLINDER	2	CUNINGHM	2.5 x 21 x 1.375
10	CROWD FRAME	1	BSS	B01-00-5002
11	BOLT	8		3/8-16 x 1"
12	NUT	2	BSS	B01-00-5004
13	NUT	2	BSS	B01-00-5004
14	SPINDLE	1	BSS	B01-00-5022
15	BEARING	2	TIMKEN	L814749
16	RACE	2	TIMKEN	L814710
17	SCREW	1		1/4-20 SHSS
18	RETAINER NUT	1	BSS	B01-00-5020
19	SCREW	12		1/4-20 FF x 3/8"
20	GUIDE	2	BSS	B01-00-5023
21	WEAR PLATE (BACK)	2	BSS	B01-00-5024
22	WEAR PLATE (SIDE)	4	BSS	B01-00-5025



11 ELEMENT KELLY

10 ELEMENT KELLY

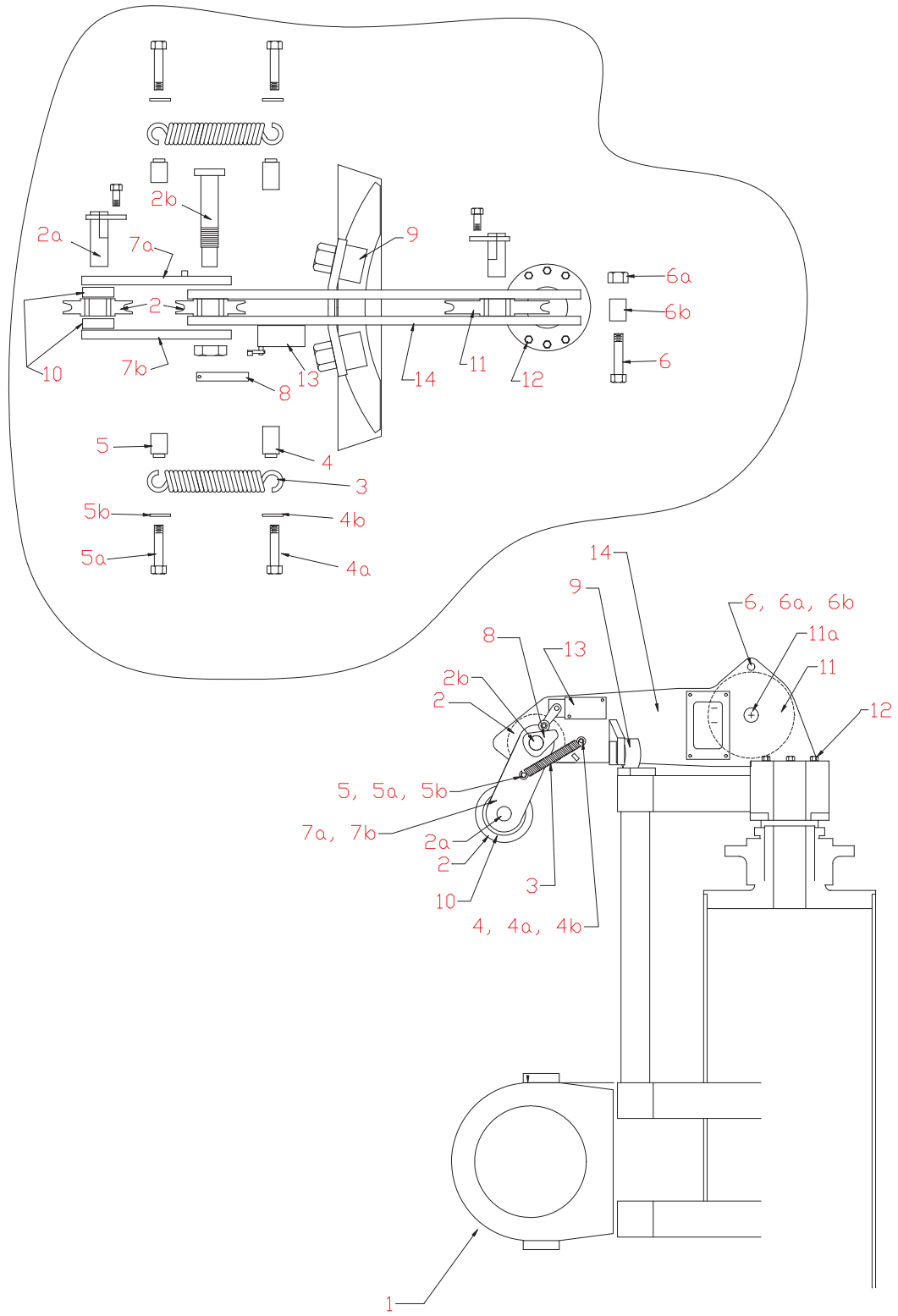
<u>ITEM</u>	<u>DESCRIPTION</u>	<u>QTY.</u>	<u>MFG.</u>	<u>PART #</u>
1	12" SQ. TUBE	1	BSS	1/4" wall x 67"
2	11" SQ. TUBE	1	BSS	1/4" wall x 65 1/2"
3	10" SQ. TUBE	1	BSS	1/4" wall x 65 1/2"
4	9" SQ. TUBE	1	BSS	1/4" wall x 65 1/2"
5	8" SQ. TUBE	1	BSS	1/4" wall x 65 1/2"
6	7" SQ. TUBE	1	BSS	1/4" wall x 65 1/2"
7	6" SQ. TUBE	1	BSS	1/4" wall x 65 1/2"
8	5" SQ. TUBE	1	BSS	1/4" wall x 65 1/2"
9	4" SQ. TUBE	1	BSS	1/4" wall x 65 1/2"
10	3" SOLID	1	BSS	calculated
11	BOLT	12		1/2-13 x 1 1/2" (Gr 8)
12	SWIVEL	1	ESMET	6750
13	KELLY ADAPTER	1	BSS	B01-00-5026
14	BEARING	2	TIMKEN	L217849
15	RACE	2	TIMKEN	L217810
16	SPINDLE HOUSING	1	BSS	B01-00-5027
17	SEAL	1	GARLOCK	26X0978
18	RETAINER	1	BSS	B01-00-5021
19	BOLT	6		1/2-13 x 1 1/2



ROTARY

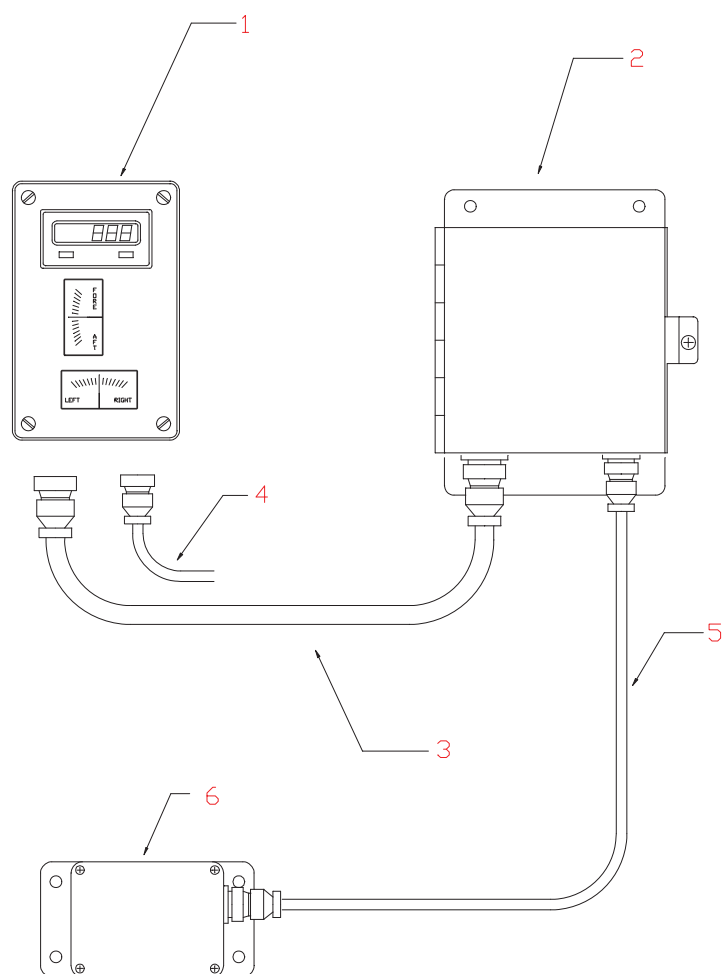
ROTARY

<u>ITEM</u>	<u>DESCRIPTION</u>	<u>QTY.</u>	<u>MFG.</u>	<u>PART #</u>
1	MOTOR	2	DANFOSS	OMV400
2	BOLT	8		1/2-13 x 1 1/2 HH (GR 8)
3	BOLT	15		3/8-16 x 1 1/4 (GR 5)
4	SEAL CARRIER	1	BSS	B01-00-5034
5	SEAL	1	GARLOCK	59-3793
6	CASE	1	BSS	B01-00-5028
7	PLUG	3		3/4 NPT
8	BEARING/GEAR	1	KAYDON	RK6-22E12
9	BOLT	15		5/8-11 x 1 SH (LC WIR)
10	QUILL	1	BSS	B01-00-5030
11	BOLT	12		1/2-13 x 1 1/4 SH (LC WIR)
12	CASE LID	1	BSS	B01-00-5029
13	BOLT	28		3/8-16 x 1 1/4 (GR 5)
14	BOLT	12		3/8-16 x 1 1/4 (GR 5)
15	SEAL CARRIER	1	BSS	B01-00-5034
16	SEAL	1	GARLOCK	59-0307
17	BOLT	2		3/8-16 x 1 (GR 8)
18	RETAINER	2	BSS	B01-00-5032A
19	PINOIN GEAR	2	BSS	B01-00-5032



KELLY WINCH and HEADBLOCK

<u>ITEM</u>	<u>DESCRIPTION</u>	<u>QTY.</u>	<u>MFG.</u>	<u>PART #</u>
1	WINCH	1	PULLMSTR	PL-5
2	SHEAVE	2	BSS	B01-00-5013
2a	SHEAVE PIN	1	BSS	B01-00-0141
2b	SHEAVE PIN	1	BSS	B01-00-5035
3	SPRING	2	CENTURY	5099 P 266
4	SPRING RETAINER	2	BSS	B01-00-5017
4a	BOLT	2		5/16-18 x 1 1/2"
4b	WASHER	2		5/16
5	SPRING RETAINER	2	BSS	B01-00-5018
5a	BOLT	2		5/16-18 x 1"
5b	WASHER	2		5/16
6	BOLT	2		1/2-13 x 2 1/2"
6a	NUT	2		1/2-13
6b	SPACER	1		B01-00-5019
7a	SHUTOFF LINK	2	BSS	B01-00-5015
7b	SHUTOFF LINK	2	BSS	B01-00-5016
8	CAM	1	BSS	B01-00-0143
9	ROLLER	2	MCGILL	CRSB32
10	SPACER	2	BSS	B01-00-5036
11	SHEAVE	1	BSS	B01-00-5012
11a	PIN	1	BSS	B01-00-0139
12	BOLT	6		3/8-16 x 1"
13	LIMIT SWITCH	1	SQ D	9007-C54B24128
14	HEADBLOCK	1	BSS	B01-00-5011

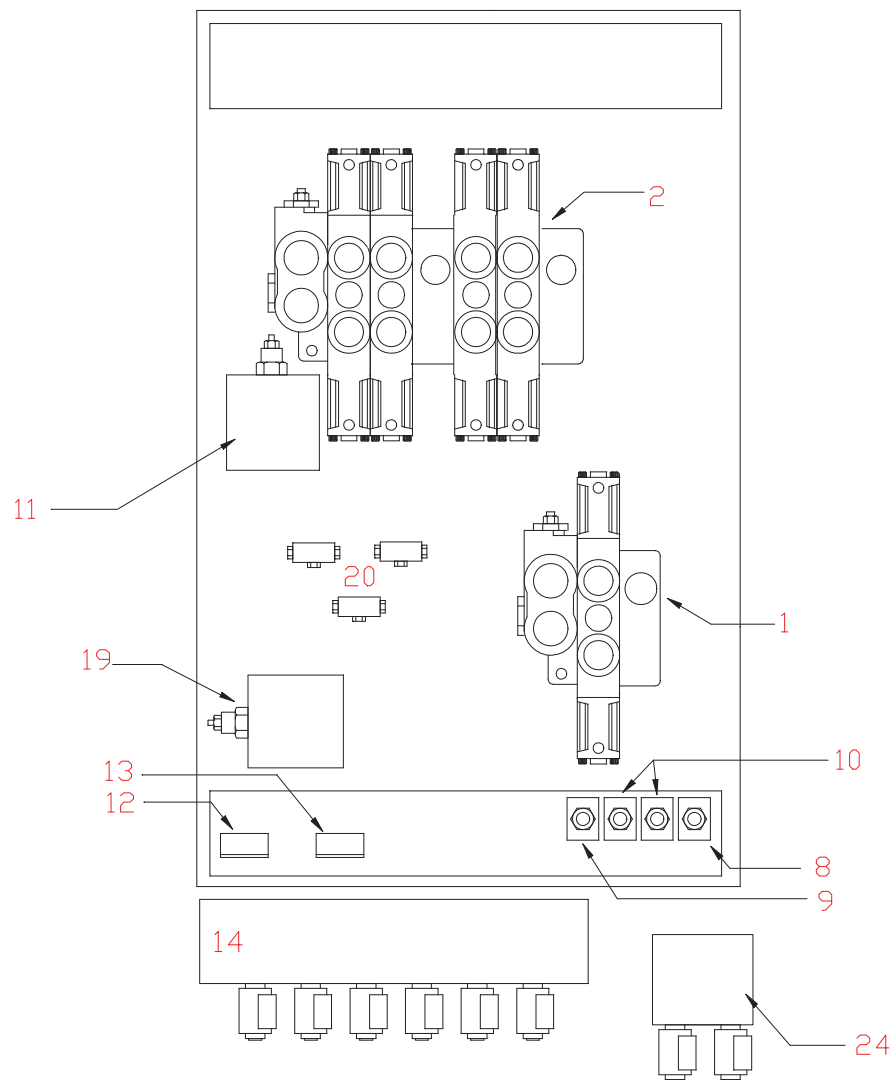


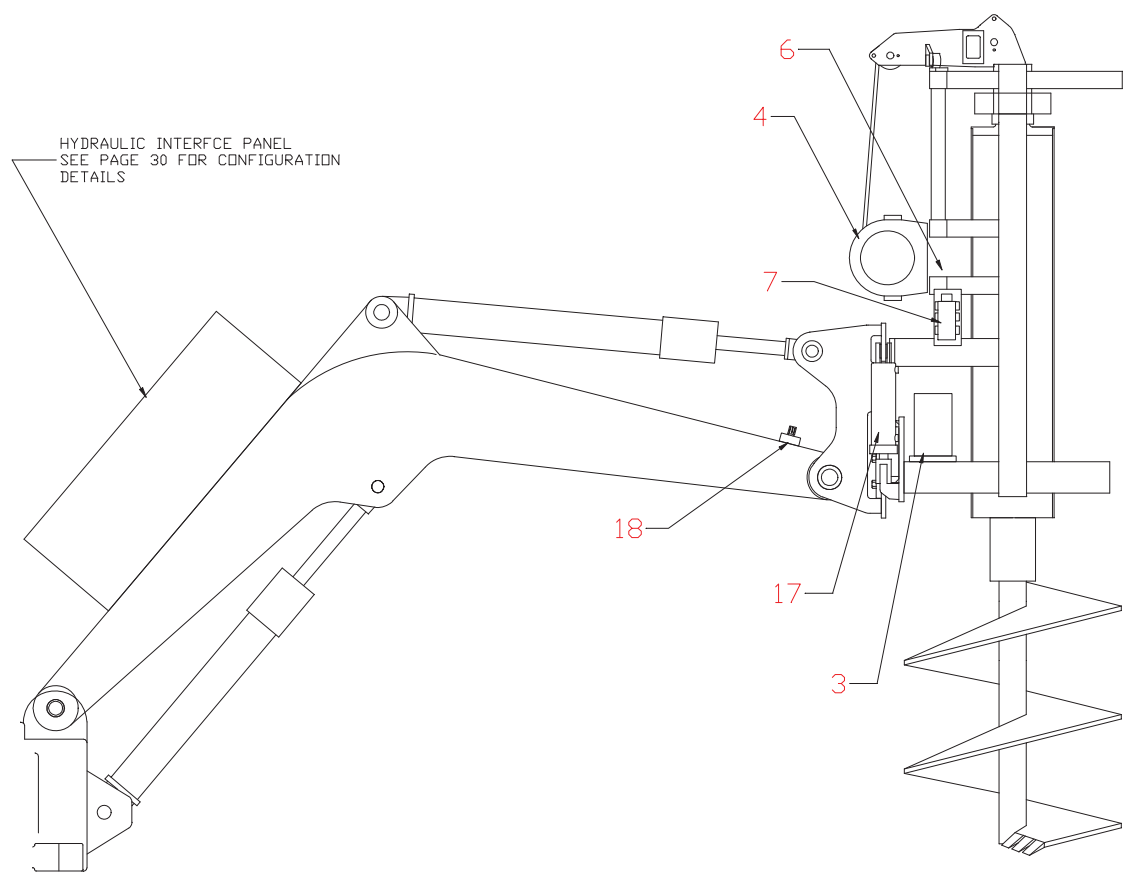
LEVEL – DEPTH INDICATOR

<u>ITEM</u>	<u>DESCRIPTION</u>	<u>QTY.</u>	<u>MFG.</u>	<u>PART #</u>
1	INDICATOR	1	BSS	B01-00-0047
2	SENSOR BOX	1	BSS	B01-00-0048
3	L/D CABLE	1	BSS	AMPH-16S1/16P1-10ft. AMPH-16S1/16S1-21ft. (hard covered)
4	POWER CABLE	1		AMP 11-4R-6 ft.
5	DEPTH CABLE	1		AMPH-14S5-7 ft.
6	DEPTH P/U BOX	1	BSS	B01-00-0049

HYDRAULIC SCHEMATICS and DRAWINGS

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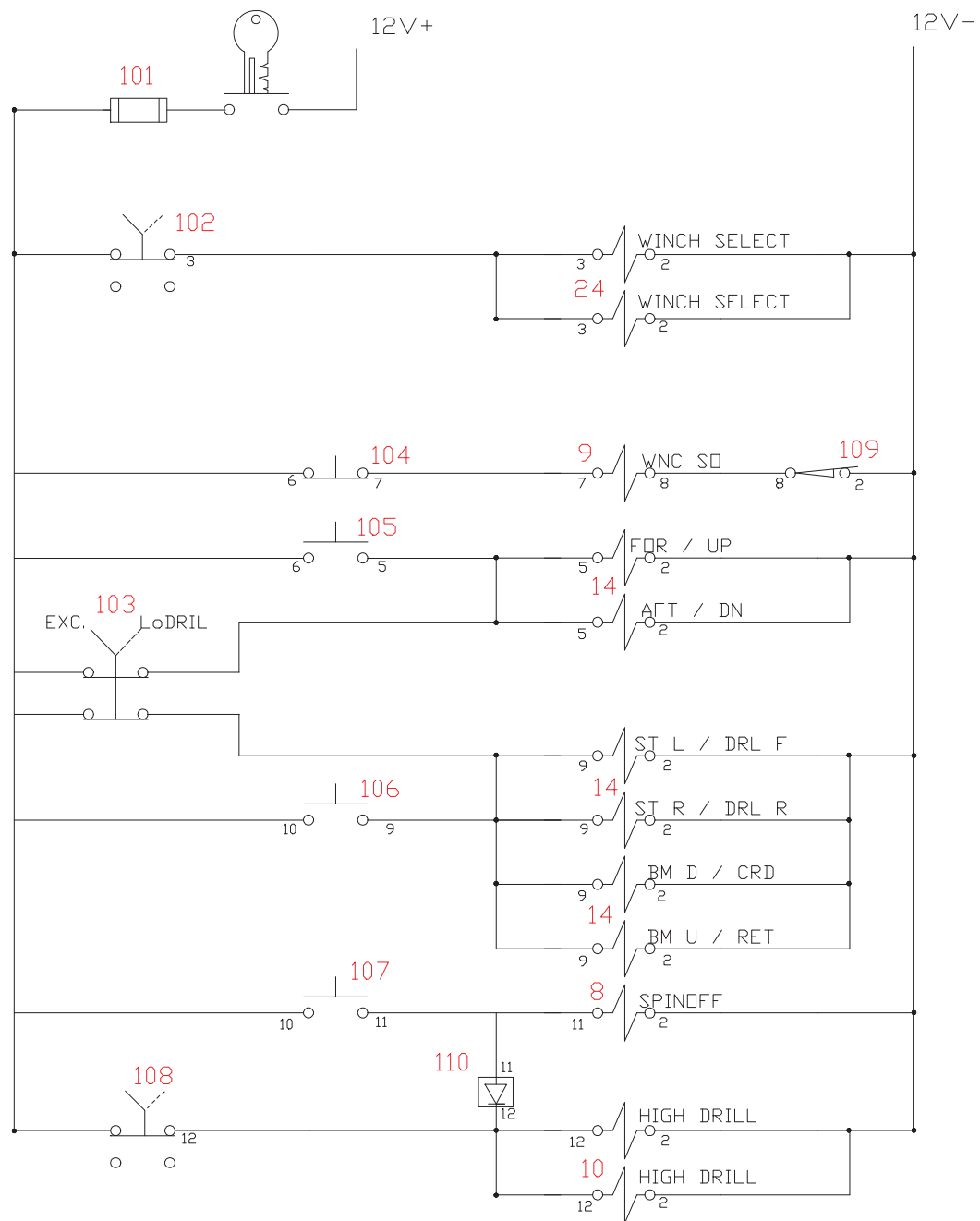


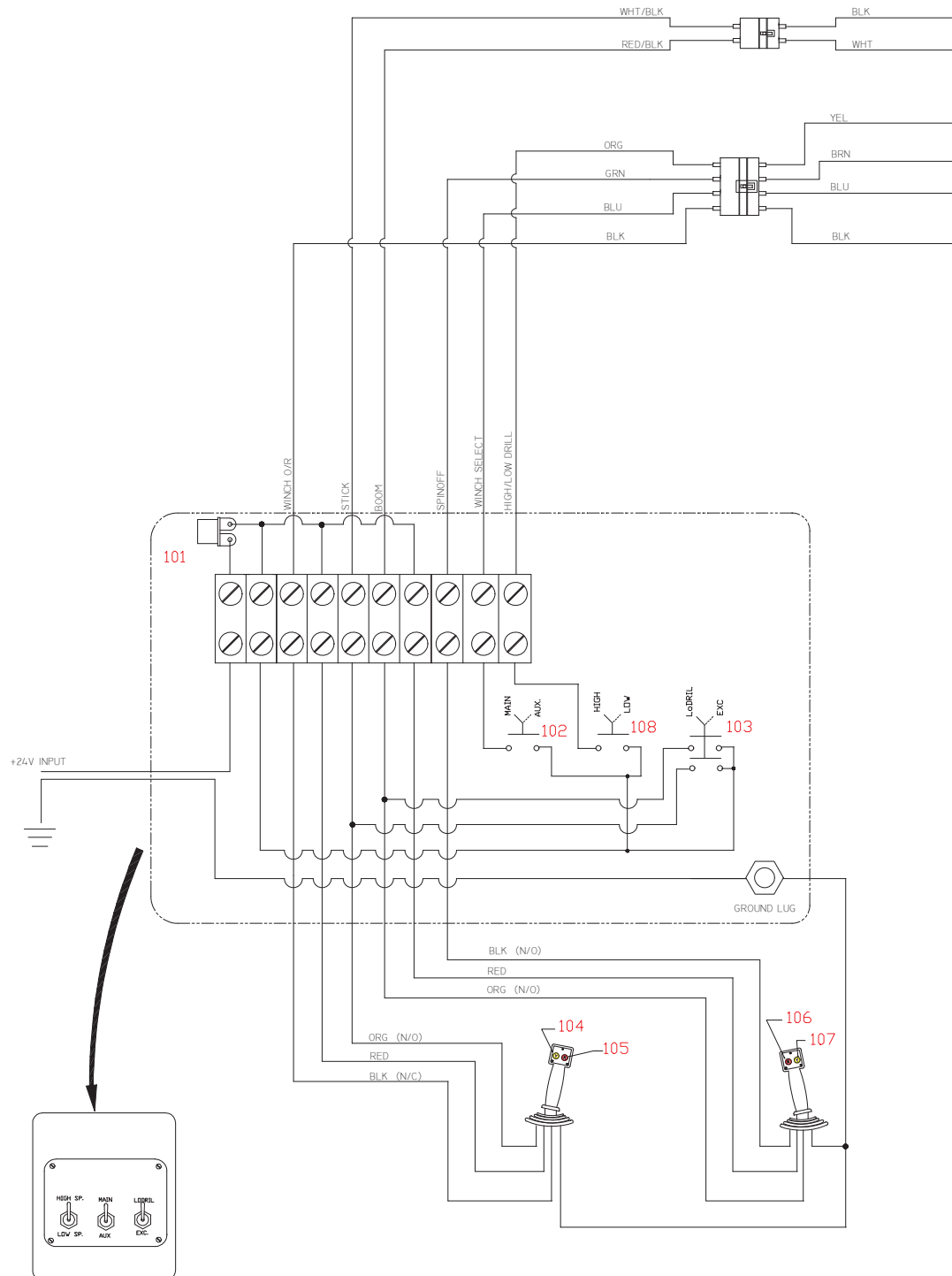


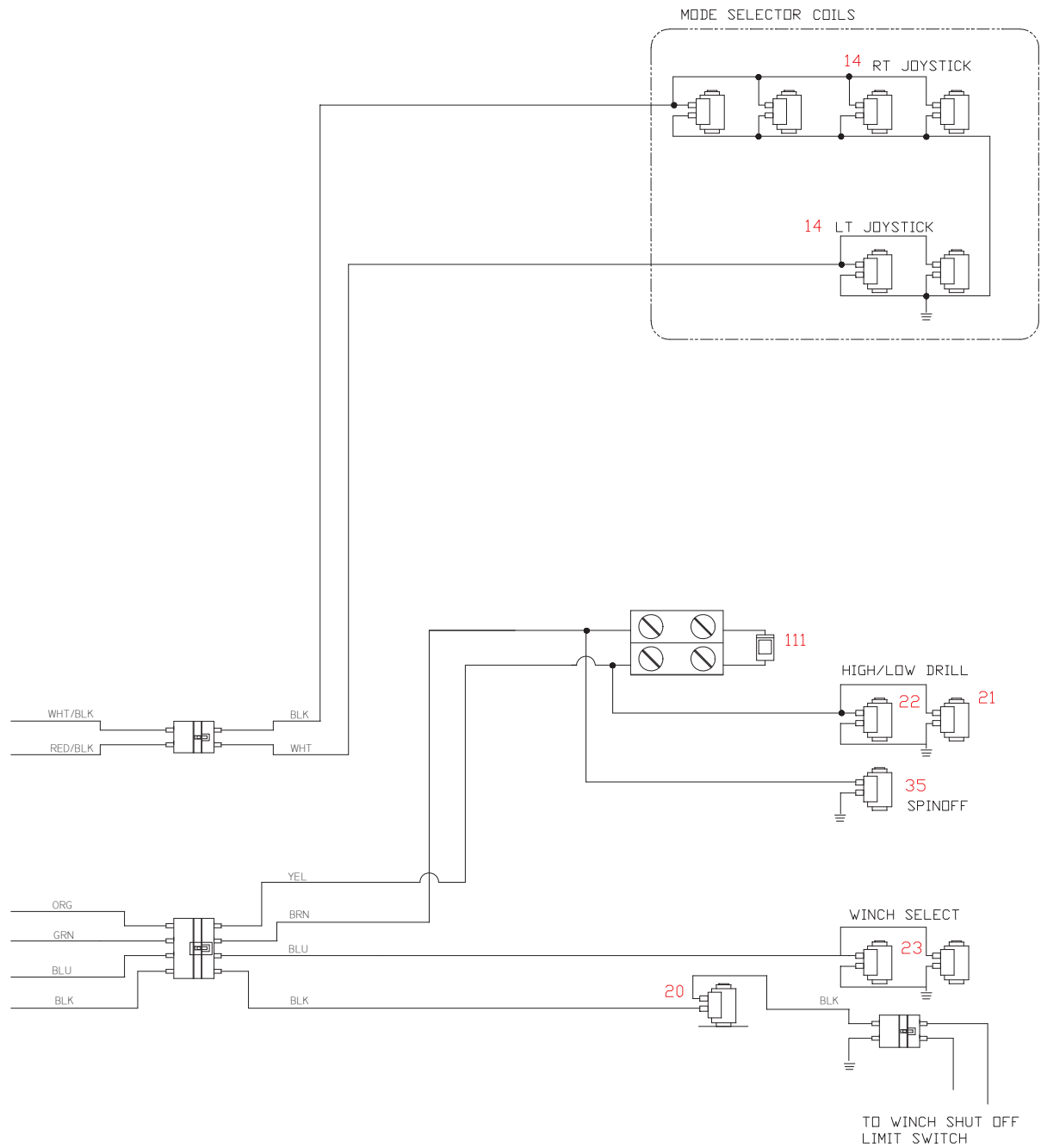
HYDRAULIC COMPONENTS

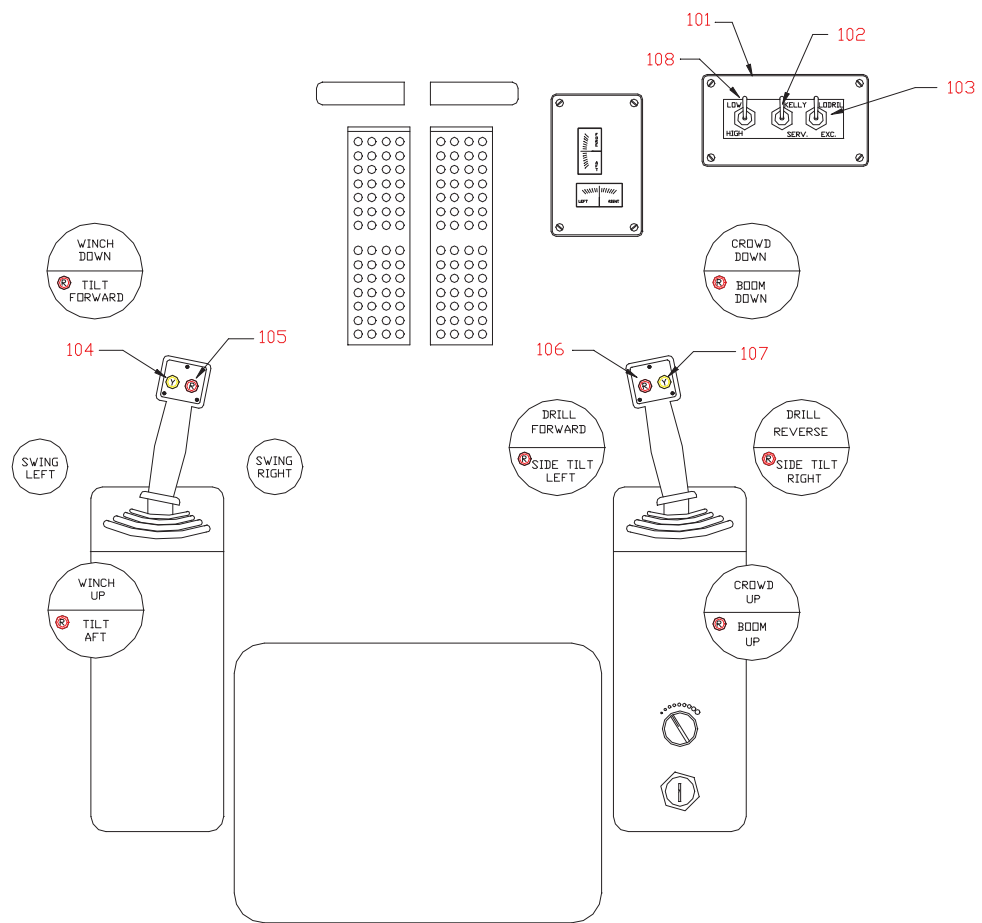
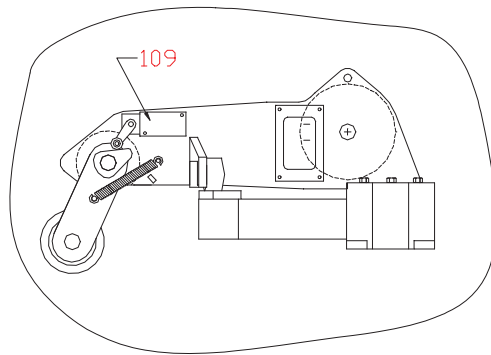
<u>ITEM</u>	<u>DESCRIPTION</u>	<u>QTY.</u>	<u>MFG.</u>	<u>PART #</u>
1	CONTROL VALVE	1	HYDRO C	HCD-12
2	CONTROL VALVE	1	HYDRO C	HCD-12
3	DRILL MOTOR	1	CHARLYNN	112-1066
4	WINCH MOTOR	1	PULLMSTR	PL5-12-167-1
5	CROWD CYLINDER	2	CUNNIGHM	2.5SHS2N212S3000
6	DUAL CB VALVE	1	SUN	CBCA-LHN-YEJ
7	DIVERTER VALVE	1	FEROY	DSP-40
8	SOLENOID VALVE	1	HYDRO F	SV08-30-0-N-00
9	SOLENOID VALVE	1	HYDRO F	SV08-30-0-N-00
10	SOLENOID VALVE	2	HYDRO F	SV08-30-0-N-00
11	FLOW DIVIDER	1	SUN	FREA-LAN HEM
12	PRESSURE GAUGE	1	LHA	0-5000-SM
13	PRESSURE GAUGE	1	LHA	0-5000-SM
14	SOLENOID VALVE	6	HYDRO F	SV08-30-0-N-00
15	JOYSTIC CONTROL	1	CYBER TEC	88-980061-01
16	JOYSTIC CONTROL	1	CYBER TEC	88-980061-01
17	TILT CYLS	2	SWECO	2.5 x 6 x 1 1/8
18	FLOW CONTROL	2	FLUTEC	DRV-8
19	PO CHECK	1	SUN	CKGB-XCN-HCD
20	SHUTTLE VALVE	3	HYDRO F	LSV-1
21	PRES. RED. VALVE	1	HYDRA F	PR08-32-0-N-12
22	SHUTTLE	1	PULLMSTR	20849
23	SERVICE WINCH	1	PULLMSTR	PL-2
24	SOLENOID VAVLE	2	HYDRA F	SV08-40

ELECTRICAL DRAWINGS









ELECTRONIC COMPONENTS

<u>ITEM</u>	<u>DESCRIPTION</u>	<u>QTY.</u>	<u>MFG.</u>	<u>PART #</u>
101	CIRCUIT BREAKER	1	LAWSON	24V15A-201
102	SWITCH	1	CUTLR HAM	8530K39
103	SWITCH	1	CUTLR HAM	8531K39
104	SWITCH	1	CYBER TEC	GRIP SW (N/C)
105	SWITCH	1	CYBER TEC	GRIP SW (N/O)
106	SWITCH	1	CYBER TEC	GRIP SW (N/O)
107	SWITCH	1	CYBER TEC	GRIP SW (N/O)
108	SWITCH	1	CUTLR HAM	8531K39
109	LIMIT SWITCH	1	SQ D	9007C54B-Y128
110	DIODE	1	RCA	SK3604

APPENDICES

TABLE of CONTENTS

ABOUT BAY SHORE SYSTEMS	1
OVERVIEW.....	2
CAUTIONS and WARNINGS	2
SPECIFICATION.....	3
GENERAL.....	4
ROTARY	4
KELLY WINCH.....	5
BOOM POINT CONNECTOR.....	5
SERVICE WINCH.....	5
KELLY BAR.....	6
LEVEL INDICATOR	6
HYDRAULIC INTERFACE PANEL.....	7
OPERATION	8
EXCAVATOR CONTROLS.....	8
DRILL CONTROLS	9
SEQUENCE OF OPERATION.....	13
MAINTENANCE.....	14
LUBRICATION DIAGRAM.....	15
MAINTENANCE DATA	15
SAFETY	16
SERVICE WINCH SAFETY	17
WIRE ROPE MAINTENANCE	18

TABLE of CONTENTS

PARTS DRAWINGS19

BOOM POINT CONNECTOR20

KELLY BAR SET22

ROTARY24

WINCH and HEADBLOCK26

LEVEL INDICATOR.....29

HYDRAULIC SCHEMATICS AND DRAWINGS.....30

ELECTRICAL DRAWINGS35

APPENDICES.....40